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Final Report

R-88-05-0302

Golden Flaxseed Breeding Project

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The Agriculture Development Fund

FINAL REPORT

R-88-05-0302

GOLDEN FLAXSEED BREEDING PROJECT

BY

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GOLDEN FLAXSEED BREEDING PROJECT

R-88-05-00309

ABSTACT PHASE 1

THE AIM OF THIS PROJECT IS TO DEVELOP A NEW SUITABLE GOLDEN FLAX VARIETY FOR THE PRAIRIE REGION.

TO THIS END, BACKCROSSES WITH COMMERCIAL VARIETIES AND LINES WITH THE GOLDEN CHARACTERISTIC HAVE BEEN ACCOMPLISHED. (THE GOLDEN CHARACTERISTIC IS DUE A RECESSIVE GENE). LINE EVALUATION OF THESE BACKCROSSES HAVE SHOWN SOME PROMISING RESULTS. ALSO GENETIC STOCK POSSESSING A DOMINANT YELLOW (GOLDEN) GENE HAS BEEN CROSSED TO SEVERAL CURRENT BROWN SEEDED VARIETIES. RESULTS FROM THESE CROSSES ARE ALSO VERY POSITIVE. IF THE DOMINANT GOLDEN GENE MATERIAL IS STABLE FOR COLOR AND HIGH LINOLENIC ACID, THIS WOULD VIRTUALLY GUARRANTEE A NEW GOLDEN VARIETY.

WE INTEND TO APPLY FOR CONTINUING FUNDING FOR PHASE 2 OF THIS PROJECT AS RESULTS TO DATE ARE VERY POSITIVE AND WARRANT CONTINUATION OF THIS RESEARCH.

OCT. 31/90

TO THE AGRICULTURE DEVELOPMENT FUND

FINAL REPORT, PHASE 1,

GOLDEN FLAXSEED BREEDING PROJECT

R 88-05-0302

DEAR SIRS;

APPENDED TO THIS SUMMARY OF PROGRESS TO DATE ARE TWO REPORTS ON THE PROJECT.

A) REPORT ON THE BREEDING PROGRAM BY DR. E. KENASCHUK, PLANT BREEDER, MORDEN, MAN.
B) FINANCIAL STATEMENT BY RETA GIBSON, MANAGEMENT ACCOUNTANT, REGINA, SASK.

A SUMMARY OF WORK DONE AND PROGRESS TO DATE CONSISTS OF:

A) IDENTIFICATION OF SUITABLE SOURCES OF YELLOW SEED COLOR
B) DEVELOPMENT OF HYBRID POPULATIONS (CROSSES OF YELLOW SOURCES WITH COMMERCIAL BROWN VARIETIES)
C) BACKCROSS OF F1 PLANTS TO RECURRENT (BROWN COLOR) PARENT
D) EVALUATION OF THE ABOVE EXPERIMENTAL LINES.
E) NEW HYBRID MATERIAL EVALUATION OF F4 AND F5 LINES FROM CROSSES INVOLVING BROWN PARENTS, NORMAN, MCGREGOR AND NORLIN.
F) NEW CROSSES WERE MADE, SOME INVOLVING THE NEWLY REGISTERED VARIETY LENORA (FP862) LENORA HAS NOT YET BEEN RELEASED TO SEED GROWERS DUE TO LOWER THAN THE MINIMUM REQUIRED SEED STOCK QUANTITY
G) MUTATION RATE TO BROWN SEED COLOR OF ASSESSION 84495

RESULTS HAVE BEEN VERY GOOD TO THIS STAGE OF THE PLANT BREEDING PROGRAM. THERE HAVE BEEN NO MAJOR SET-BACKS OR REVERSES IN THIS WORK. SEVERAL MINOR LOSSES OCCURRED DUE TO THRIP DAMAGE, ANOTHER (MUTATION RATE OF 84495 TO BROWN COLOR) BECAUSE OF SOIL CRUSTING RESULTING IN LOW YIELDS AND LASTLY DROUGHT. THE PREVIOUS YEAR RESULTED IN LOWER THAN NORMAL YIELDS, BUT WITH NO WORK DESTROYED.

DR. KENASCHUKS REPORTS OF MAR 89, FEB 90 AND OCT 90 GIVE FULLER INFORMATION ON ALL ASPECTS OF THIS BREEDING PROGRAM.

TO THIS DATE ALL ADF FUNDS HAVE BEEN EXPENDED AND HAVE BEEN USED FOR PAYROLL EXPENSES TO HIRE THE SERVICES OF A PART-TIME TECHNICIAN, PEGGY BERGMAN, TO ASSIST DR. E. KENASCHUK AT THE MORDEN RESEARCH STATION.

NO CAPITAL ITEMS WERE PURCHASED, LEASED OR CONSTRUCTED. TOTAL EXPENDITURES FOR MYSELF, MR. FARLEY OR FOR AG. CANADA FOR LAB FACILITIES, SUMMER AND WINTER PLOTS AND PLOT WORK, GREENHOUSE, GROWTH CHAMBER OR PLANT BREEDER SALARY AND EXPENSES HAVE NOT BEEN INCLUDED IN THE FINANCIAL STATEMENTS.

THERE HAS BEEN NOTHING OF COMMERCIAL VALUE PRODUCED TO THIS STAGE OF THE PROJECT.

THE SUCCESS TO DATE OF THIS PROJECT WARRANTS CONTINUATION OF THE GOLDEN FLAXSEED BREEDING PROGRAM TO THE CONCLUSION OF THE DEVELOPMENT OF A NEW VARIETY OR LINE. TO THIS END, WE HAVE APPLIED (AND RECIEVED) FUNDING FOR PHASE 2 OF THE GOLDEN FLAXSEED BREEDING PROGRAM.

RESPECFULLY SUBMITTED,

TOM JACKSON

OCT 30 /90

REPORT OF YELLOW-SEED (GOLDEN) FLAX PROGRAM - 1990

Agriculture Canada
Research Station
Morden, Manitoba

Program Objective: To develop a suitable yellow-seeded variety for the prairies

1. Backcross Programs

The main focus of the project is the incorporation of the yellow seed characteristic into commercial varieties such as McGregor and NorLin by the backcross method. An introduction from Australia, 84495, and two introductions from Germany, 26-27 and 171-77, are being used as sources of the yellow seed colour. The backcrosses completed in 1989-90 were:

26-27/McGregor - 5th and 6th backcrosses
26-27/NorLin
171-77/McGregor
171-77/NorLin

84495/NorLin - 4th, 5th and 6th backcrosses

84495/McGregor - 3rd, 4th and 5th backcrosses
84495/FP 862

The F_1 of all backcrosses will be grown in the greenhouse in the winter of 1990-91.

A backcross program was initiated using the new varieties, Flanders and Somme as recurrent parents and 84495 as the source of the yellow seed colour.

2. Evaluation of Experimental Lines

A. Yield Tests

Ten yellow-seeded lines were evaluated in preliminary yield tests located at Morden and Portage la Prairie in Manitoba, and Indian Head and Melfort in Saskatchewan. Data is available only from the Morden test at this time.

Entry No.	Variety or Cross	Yield 00' kg/ha	Yield as % of NorLin	Days to Maturity	Height cm
	NorLin	20.8	100	83	63
	Vimy	20.3	98	82	65
M2619	Dufferin//M1687	18.8	90	88	63
2635	M1687//5173	19.5	94	88	67
2636	M1687/5173	18.0	87	86	65
2641	NorMan//M1697	15.6	75	89	65
2658	Dufferin/M1697	20.8	100	84	59
2660	Dufferin/M1697	20.6	99	86	62
2664	Dufferin/M1697	19.5	94	88	64
2669	M1692/5149	18.9	91	85	65
2671	M1697/5061	18.3	88	86	61

M1697 - McGregor/Foster
M1692 - McGregor/Foster
M1697 - NorLin/Foster

Two lines, M2658 and M2660, were equal to NorLin and Vimy in yield and were agronomically very uniform. If yields are maintained in other locations, these lines will be entered in the 1991 Joint Project Test.

B. Hybrid Nursery

In 1990, hybrid material that was evaluated included F_4 and F_5 lines from crosses involving McGregor and NorLin with yellow-seeded Szegedi 62, 26-27, 171-77 and U605, and NorMan and FP 866 with U605. Only 10% of 2091 lines were selected on the basis of desirable agronomic type.

Cross	No. of Lines evaluated	No. of Lines selected
F_5 Lines		
McGregor/Szegedi 62	22	3
McGregor/U605	135	36
NorLin/Szegedi 62	18	6
NorLin/U605	138	12
F_4 Lines		
26-27/NorLin	747	82
171-77/NorLin	468	32
26-27/McGregor	222	19
171-77/McGregor	145	0
Norman/U605	100	8
U605/FP 866	96	10
	2091	208

Three plants were harvested from each selected row and the progeny of these lines are being grown in a winter nursery in California.

The F_2 plants from a cross between NorLin and the yellow-seeded German introduction, 22-82-1-89, were grown in the field and the F_3 progeny of these plants will be grown in the greenhouse in the winter of 1990-91. Selection will be based on early maturity.

3. New Hybrid Populations

Sixteen crosses, as indicated below, were made in the field and greenhouse to generate new hybrid populations:

M2635	FP 862 (Linora)
2658	FP 862 - Line 18
2660	Flanders
2664	M2704 (High oil line)

The F_1 generation of these crosses will be grown in the greenhouse this winter.

4. Identification of New Sources of the Yellow-Seed Colour

Ten introductions from Germany were evaluated in a replicated yield test at Morden and Portage la Prairie. Data from these tests are not available at this time. However, only 4 of the lines were sufficiently early to be of value in this program. These introductions will be used in the crossing program.

5. Mutation Rate to Brown Seed Colour in 84495

This study was not carried out because of very low plant populations in the field due to poor emergence resulting from soil crusting.

Objectives for 1990-91

1. Identify backcross lines which are homozygous for the yellow-seed colour and agronomic similar to the recurrent parents. Evaluate F_2 and F_3 generation of backcross lines in the field and determine oil content, oil quality and rust reaction of selected lines.

2. Evaluate at least one yellow-seeded line in the Joint Project Test.

3. Continue selection in hybrid populations processed by the pedigree method of breeding. Identify agronomically suitable lines for yield evaluation in 1992.

4. Continue backcross program with varieties Somme and Flanders.

5. Generate hybrid populations using new sources of the yellow seed colour.

6. Determine mutation rate to the brown seed colour in 84495.

Dispersement of Funds

All Funds received in this project were used to hire a technician (P. Bergman) for 24 weeks, January 9 to June 22, 1990.

E.O. Kenaschuk

October 25, 1990